

ARGYROXIPHIMUM KAUENSE, THE KAU SILVERSWORD

\*Degeners & Sunadas

The Hawaiian Islands are peculiar in having four endemic genera of Compositae belonging to the preponderately American Subtribe Madinae. These are Raiiiliardia and Dubautia, two groups like Bidens and Cosmos kept separate for convenience even though they intergrade imperceptibly; Wilkesia; and Argyroxiphium, to which the famed silverswords belong. Of the latter genus, several species grow on the Islands of Maui and Hawaii. Here we wish to describe more fully one of the lesser known. It grows on the southern slope of Mauna Loa in the Forest Reserve at about 6,000 feet elevation in the fog belt in wet humus among aa lava. It was collected as early as 1911 by C.N. Forbes, and incorrectly identified. Forester L.W. Bryan's collection of July 1956 was studied by J.F. Rock and Marie C. Neal, and too briefly described as Argyroxiphium sandwicense var. kauense in Occas. Pap. B.P. Bish. Mus. 22(4):31-33. 1957. It was renamed A. kauense (Rock & Neal) Deg. & Deg., in Flora Haw. Dec. 27, 1957.



The colony of Argyroxiphium kauense in the fog belt

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Several unbranched Argyroxiphium macrocephalum  
Endemic to Haleakala, Island of Maui

The Degeners had found and studied a few isolated, live specimens in 1968. But under the guidance of Kaoru Sunada, Chairman of the Silversword Protection Committee, and Mrs. Sunada, on August 7, 1974 they were led to a magnificent colony of the species. With seedlings, the colony may number several thousand plants. About 250 were in full bloom at the time, but not a single one in seed. For the present description, therefore, a few achenes were used that had been stuck by spider or caterpillar threads to a dead, decayed head. Evidently the plants grow perhaps for five to ten years, burst into flower during a short season and give off a faint fragrance, mature their seed a few months later, and then die completely!

As the Kau silversword is such a beautiful plant, very localized in distribution and exposed to extinction in case a flow of lava should overwhelm the area from the summit of actively volcanic Mauna Loa, or from introduced insects and

browsing animals or exotic weeds, Chairman Sunada, nisei citizen of the State of Hawaii, is prepared to send his photographs and fresh seeds to botanical gardens and institutions in Japan on condition that the recipients will conscientiously try to cultivate this magnificent plant. We hope Hawaii shall add beauty to Japanese gardens with the Kau silversword. Its botanical description, based on living material, is as follows:

ARGYROXITHIUM KAUENSE (Rock & Neal) Deg. & Deg., the KAU SILVERSWORD

Basally woody perennial with taproot bearing few sideroots, short-creeping and sparingly rooting from stem, very rarely few-branched near base, ending several dm. above ground before flowering in depressed-globose commonly 3 dm. wide and 2 dm tall sphere of loosely arranged arcuate-ascending living leaves above marcescent-retorse ones; after several years' development quickly producing an erect raceme to become commonly 15 dm. tall; a few may be as short as 7 dm. or as tall as 20 dm.; entire unbranched plant dying after seeding (or in the few conspicuously branched specimens observed only the seeded branch dying). Leaves linear, firmly fleshy, up to 30 cm. long, in cross section narrow diamond-shaped and 5-6 mm. wide and 2.5 mm. thick, from glutinous glabrous 12 mm. wide base, with acute apex appearing mucronate because of projecting appressed hair, with 5-8 impressed longitudinal ribs on upper surface but smooth on lower surface, pale green and densely pubescent with appressed dark grayish silvery silky hair; dying leaves grayish purplish as are also injured parts of stem. Raceme narrow-elliptic in outline, yellow-green, the main hollow longitudinally ridged stem about 2 cm. thick with 100-150 single nodding heads, those toward base and top of raceme smaller and on shorter pedicels (with exception mentioned below); bracts only of lower part of raceme often 9 cm. long with 8 mm. wide base, with lower half glabrate to clammy-pubescent but upper half silvery-pubescent like leaves and linear-lanceolate to acuminate apex, with midrib prominent; bracts upward in raceme as long as pedicel and head or shorter, becoming greenish yellow, entirely clammy-pubescent and never silvery, mostly 25 mm. long and 2 mm. wide, narrowly elliptic but upward of raceme becoming finally linear; pedicels near base of raceme about 14 cm. long but toward apex of raceme gradually reduced to about 3 cm., pithy stiff, erect-spreading, pale yellow with green tinge, densely clammy-pubescent throughout with spreading glandular hair, flattened, bearing along margin of narrow sides several bractlets often suboppositely arranged and mostly similarly glandular; bractlets linear-lanceolate, chiefly on upper half or third of pedicel, pale greenish with thick pale yellowish midrib, 2 or 3 but toward top of raceme fewer and smaller and finally none. Involucre campanulate, pale greenish, with erect-spreading short glandular hair, 10-20 mm. wide, 15-22 mm. high; involucre bracts about 30, more or less connate, 1.2-2 mm. wide, linear-lanceolate, in single row but some slightly overlapping lengthwise, acute to acuminate; receptacle slightly convex, 7 mm. wide, glabrous within; terminal head of raceme larger than all others and blooming precociously early with as much as 10 cm. of inflorescence immediately below still remaining in bud. Ray florets pistillate,

8 or usually less per head; ovaries blackish, shiny; corolla tube somewhat curved outward; ligule 5-6 mm. long, recurved, wrinkled lengthwise, usually 3-parted often with central lobe narrowest, rarely 2- or 4-parted, mostly yellowish but in some plants all white, in others white toward top of raceme but pale claret elsewhere, in still others pale to bright claret throughout; style branches glabrous, dark purplish. Disk florets 75-150, tubular, 4-6 mm. long, green below but from about middle of corolla tube becoming increasingly more pink-claret; style branches pale yellow, with short papillose stigmas; anthers dark yellow; connective deltoid at apex. Disk achenes brownish black, shiny, 7-10 mm. long and 1.5 mm. wide, smooth but strongly 5-angled, straight (near center of head) to curved (near periphery), linear-clavate, with narrow truncate base having central mucro, with wider rounding top surmounted by firm pale-stramineous crown of three 0.5 mm. long and two 1.5 mm. long fimbriate pappus awns.

Type Locality: "Kahuku, above Kau Forest Reserve at Charlie Stone, altitude 6,700 feet, flowering and fruiting, July 1956, type L. William Bryan 25670 in Bishop Museum."

We must not confuse the Kau silversword with other silverswords growing on the Island of Hawaii. A. kauense grows on Mauna Loa at about 6,000 feet elevation in the fog belt. When ready to produce its inflorescence, the plant consists of a sphere of loose and somewhat flaccid, dark grayish, silvery leaves on an erect stem one decimeter or more above the ground. A. sandwicense DC., with probably several good varieties and forms, is peculiar to elevations of 8,000 to 10,000 feet on the same island. It grows in volcanic cinders exposed to intense sunlight alternating with some fog and occasionally snow. Before producing its magnificent inflorescence it consists of a sphere of compact, stiff, silvery leaves not borne on a long stem, but flat on the ground. A. macrocephalum A. Gray, with a similar appearance to A. sandwicense, is endemic to Haleakala, a mountain forming the eastern part of the Island of Maui. In 1936 government officials planted fifty of these Maui plants on the Island of Hawaii. As the first of these flowered and seeded in 1947, we today are not sure whether A. sandwicense and A. macrocephalum have hybridized. Are some unusual specimens of A. sandwicense true, natural varieties and forms or merely hybrids with A. macrocephalum due to this unfortunate 1936 introduction? At least all the specimens examined of A. kauense show no evidence of hybridization with other species.

The recently published statement that "Collectors and grazing have endangered the silversword, Argyroxiphium kauense, in Hawaii" is misleading. The colony grows at an elevation accessible only with some difficulty by jeep. The collectors during the last decade, so far as we know, have been the Degeners, the Sunadas and a National Park Ranger or two. The Degeners have taken a single flowering plant for shipment in preservative to Cornell for the making of a scientifically exact drawing. They have carefully removed two leaves and one flowering head only from each of fifty indi-

vidual plants for distribution to fifty leading botanical institutions of the World, and taken a dozen seedlings for planting at 4,000 feet elevation. The Sunadas and the Rangers have collected seed for successfully propagating the silversword in Hilo and near the National Park Administration Building next to other species for comparative studies. The efficient method of inducing germination is to place the achenes between moist paper towels and to store them thus for several weeks in the refrigerator at cold but not freezing temperatures. the terrain is too rugged for cattle, and we never noted evidence of the presence of goats. Apparently the Kau silversword never was abundant like the Haleakala one.



A rare branch of Argyroxiphium kauense  
Endemic to Mauna Loa, Island of Hawaii